FOUR NEW SPECIES OF THE GENUS PSORERGATES TYRELL FROM EUROPEAN HOSTS (ACARINA, PSORERGATIDAE)

by

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Abstract

Four new species of the genus *Psorergates,* itch mites of small mammals, are described. Systematic positions are discussed. The new species *Psorergatus muscardinus, baueri, neerlandicus* and *quercinus* are parasites of *Muscardinus avellanarius* (Germany), *Neomys fodiens* (Austria), *Microtus oeconomus* (the Netherlands) and *Eliomys quercinus* (Spain), respectively.

Introduction

This study is a continuation of a series of investigations on Psorergatidae, itch mites of rodents, carnivores and insectivores from Europe (Fain, Lukoschus & Hallmann, 1966; Lukoschus, Fain & Beaujean, 1967; Lukoschus, 1967, 1968a, b, 1969; Fain & Lukoschus, 1948; de Cock, Lukoschus & Ariani, 1971) and Canada (Kok, Lukoschus & Clulow, 1970, 1971).

When systematically investigating European hosts, one of us (F.L.) succeeded in discovering new species of the genus *Psorergates* which are described below.

The species have been collected from alcohol preserved hosts in Naturhistorisches Museum, Wien (Dr. K. Bauer), Centro Pirenaico de Biologia Experimental in Jaca, Spain (Prof. Dr. E. Balcells R.), from dor-mice kindly sent to us for observations by Dr. O. Henze, Institut für angewandte Zoologie, München, and from freshly trapped voles. We highly appreciate the kind co-operation of our colleagues.

Psorergates muscardinus spec. nov.
(Figs. 1—13)

Female (holotype). — Shape and body as in other species of the genus *Psorergates.* Length including gnathosoma 178 μ, average in 18 paratypes measured 168 μ (145—186), width 145 μ, average in the paratypes 139 μ (124—152).

Venter (Fig. 1). Cuticle soft. Ventral setae (*vs*) 10 μ (8—12), distance between ventral setae 12 μ (7—14). Genital opening (*vu*) 18 μ (15—19) long, lying between two adanal lobes, each of which carries a pair of terminal setae of about 81 μ (69—88). Epimerae I bent abroad. Epimerae II—IV beneath body surface.

Legs inserted ventro-laterally. Articulation between epimera and trochanters strongly sclerotized. All trochanters with a long and strongly sclerotized ventral spur that is pointing to the anterior part of the body. Femora of all legs with a large prominent ventral spur and a pair of postero-lateral setae. Length of these setae 23—27 μ on femora

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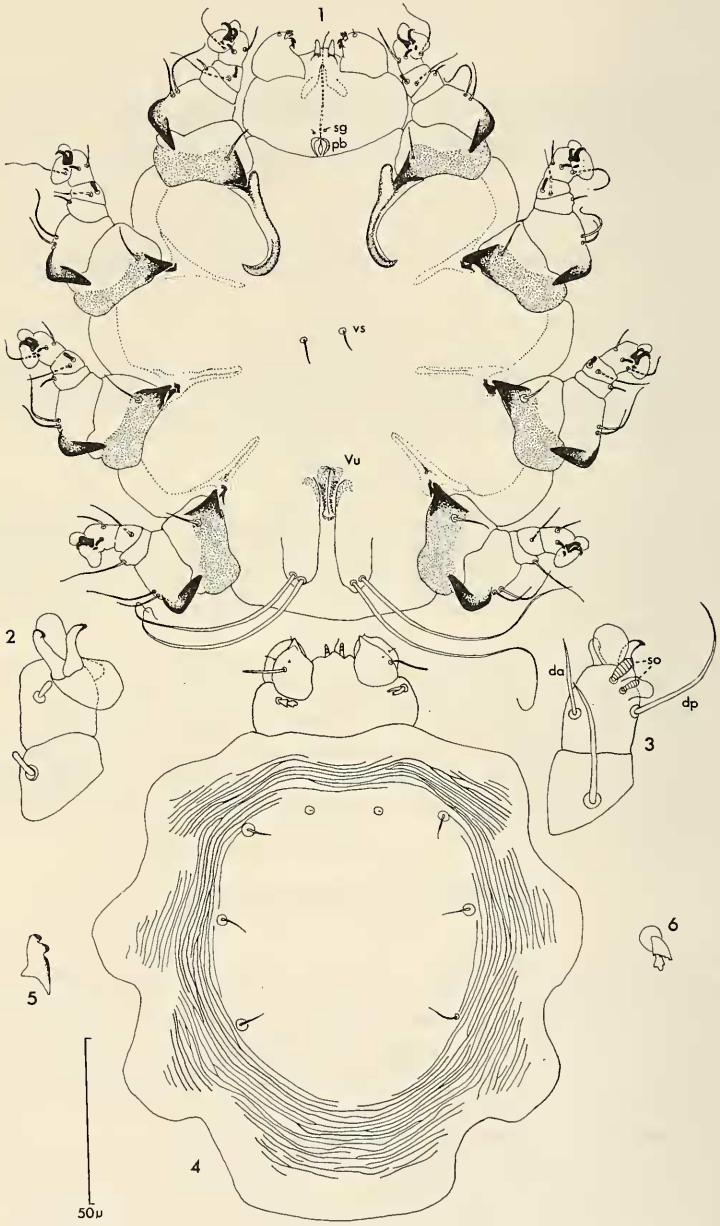

Fig. 1—6. *Psorergates muscardinus* spec. nov. female. 1, holotype, venter; 2, leg I, tarsus and tibia, ventral; 3, leg I, tarsus and tibia, dorsal; 4, holotype, dorsum; 5, chelicera in lateral view; 6, gnathosomal seta

I—IV. Apical seta of each pair almost twice as long as basal one. Genua with postero-lateral seta, 5 μ on genua I—III and 17 μ (17—29) on genu IV. Tibiae with short club-like spines antero-ventrally (not present on leg IV) and a longer dorso-medial seta. Tarsi with long dorso-posterior seta (*dp*), shorter dorso-anterior seta (*da*) and latero-ventral club-like spine (Fig. 2). Postero-dorsal seta not present on tarsi IV. Tarsi I and II dorsally with two solenidia (Fig. 3), dorso-medial solenidion bulbous, antero-lateral one lying inside a duplication of the epidermis. Two single-pointed claws and a bilobed empodium inserted ventrally at the end of the tarsi.

Dorsum (Fig. 4). Dorsal shield well sclerotized and distinctly punctured. Length of shield 99 μ, average in paratypes 101 μ (96—106), width 78 μ, average in paratypes 80 μ (74—83). Three pairs of lateral setae present on the shield, second pair about 8 μ (8—9) long. Antero-medially of the first pair of lateral shield setae a pair of minute setae present, 11 μ (10—12), at some distance of the margin of the shield. Soft parts of the dorsal side striated.

Gnathosoma and mouth parts like in other *Psorergates* species. Gnathosomal setae (Fig. 6) 5,5 μ (5—7) long, bilobed with slightly incised borders. Subgnathosomal setae (*sg*) short, pharyngeal bulb (*pb*) oval with a gland duct to mouth opening. On the palpal tibia two dorsal setae present, the anterior one very small, length of posterior seta 12 μ (12—14). Further present on the palpal tibia a small soft lateral seta and a spur on the dorsal end. Palpal tarsus with a bi-pointed and a three-pointed claw. Chelicerae with stinging bristles and dentated digitus fixus. The digitus fixus from a squashed paratype in lateral view is given in Fig. 5.

Male (allotype). — Shape and body like in other *Psorergates* species. Length including gnathosoma 154 μ, average in 15 paratypes measured 144 μ (131—154), width 138 μ, average in the paratypes 125 μ (115—138).

Venter (Fig. 8). Similar to that in female, but only with two terminal setae of 34 μ (32—38) on a sclerotized medial tubercle. Legs as in female, but all setae somewhat shorter: ventral setae 8 μ (6—10), distance between ventral setae 14 μ (13—20), trochanteral setae 8 μ (7—9), femoral setae I—III 15 μ (14—16), femoral setae IV 20 μ (17—22), genual setae I—III 4 μ, genual setae IV 16 μ (13—18).

Dorsum (Fig. 7). Genital opening near medio-anterior border of shield. Two pairs of minute genital setae beside the genital opening, posterior setae 8 μ (8—9) apart, anterior setae 5 μ (3—5) apart. Length of the very weakly sclerotized dorsal shield 99 μ average in the paratypes 89 μ (79—99), width 74 μ, average in the paratypes 68 μ (63—74). Single-pointed penis of 29 μ (29—34), penis envelope 22 μ (18—24), on dorsal side shorter. Striation pattern of the soft dorsal parts different from female.

Gnathosoma and mouth parts built as in female. Posterior palpal tibial setae 5 μ (3—5) and gnathosomal setae 3 μ (3—5).

Immature stages. — Egg with thin shell, almost globular. Dimensions of five measured eggs: 92 × 87 μ, 90 × 85 μ, 120 × 108 μ, 110 × 108 μ, 103 × 101 μ.

Larva (Fig. 9). Disc-shaped with three pairs of two-segmented legs. Average length in 11 specimens measured 106 μ (97—120), average width 87 μ (78—99). Cuticle soft, with indistinct dorsal striation. Trochanters with well developed spurs, small indistinct epimerae, segments, femur to tarsus fused, forming a flattened unit with two three-pointed claws. Gnathosoma (Fig. 10) almost as large as in adults, but setae on gnathosoma (Fig. 11) somewhat smaller, subgnathosomal setae longer than in adults.

Protonymph (Fig. 12). Like larva, but four pairs of two-segmented legs. Fused

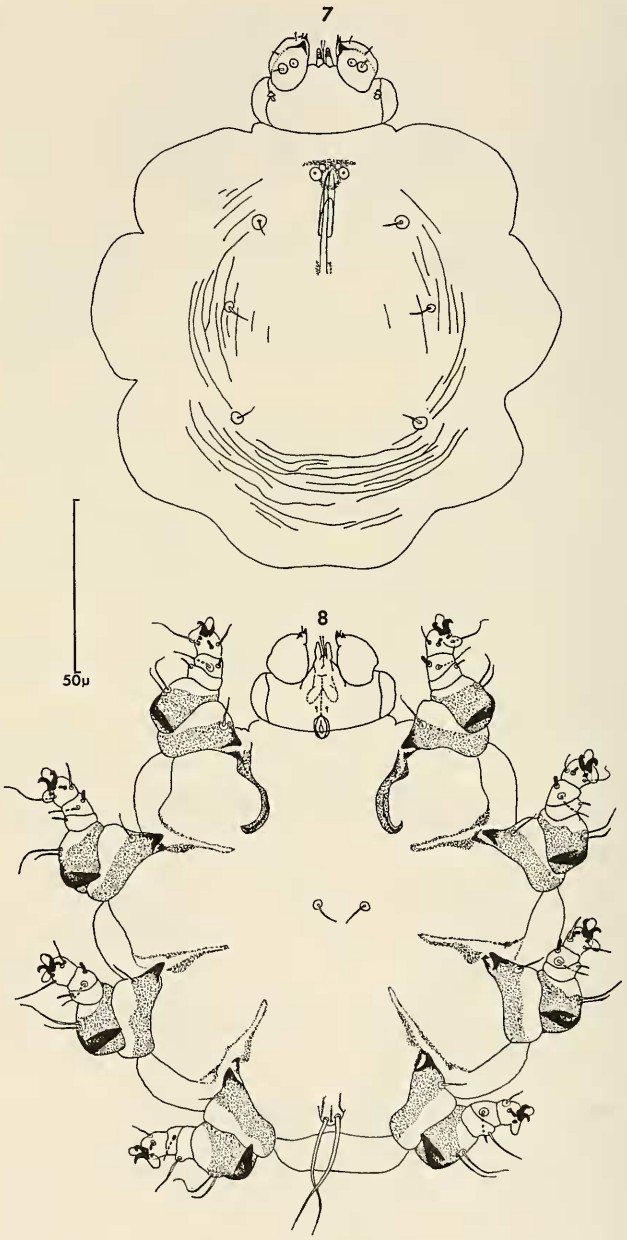

Fig. 7—8. *Psorergates muscardinus* spec. nov. male. 7, allotype, dorsum; 8, allotype, venter

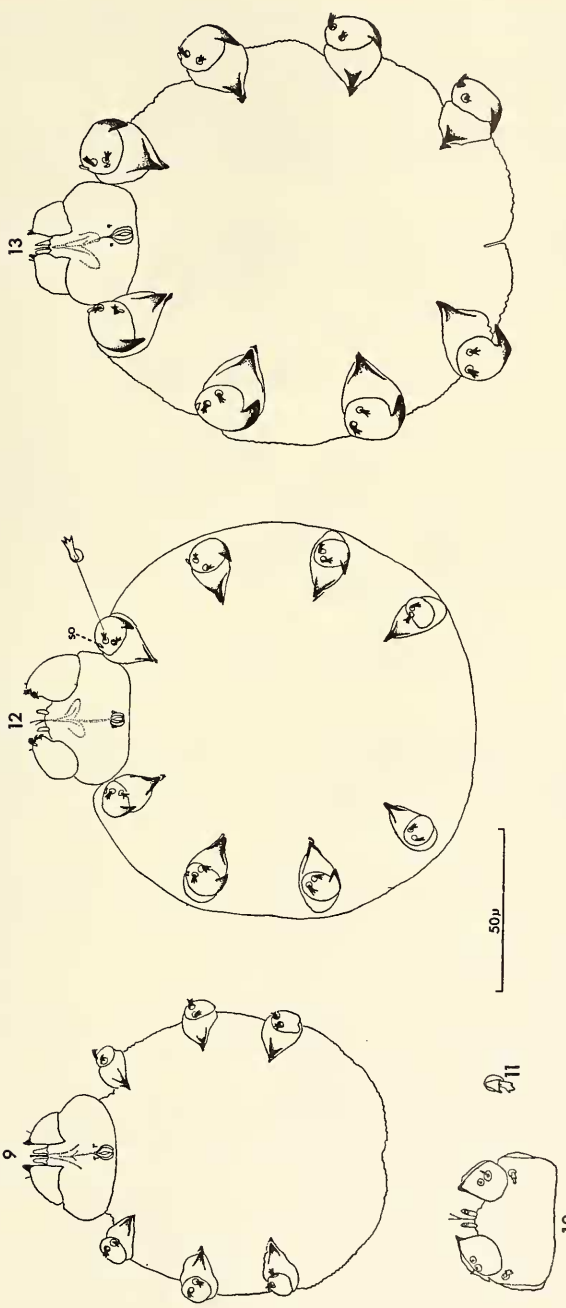

Fig. 9—13. *Psorergates muscardinus* spec. nov. developmental stages. 9, larva, venter; 10, gnathosoma larva, dorsal; 11, gnatosomal seta of larva; 12, protonymph, venter; 13, deutonymph, venter

segment with an apophysis that may be lacking on leg IV. Solenidia (*so*) present on legs I and II. Setae on gnathosoma longer than in larva, exept subgnathosomal setae. Average length in 6 specimens measured 127 μ (115—143), average width 108 μ (97—122). Posterior palpal tibial setae longer than in larva.

Deutonymph (Fig. 13). Like protonymph, but larger. Spur on the fused segment bigger than in protonymph and never lacking on leg IV. Two solenidia present on leg I, one solenidion on leg II. Gnathosomal setae longer than in protonymph, as well as posterior palpal tibial setae (4—5 μ), but shorter than in adults. Average length in 10 specimens measured 161 μ (149—184), width 138 μ (124—156).

Type host. — *Muscardinus avellanarius* Linnaeus.

Type locality. — München, Germany, 18.V.1969 and 8.VII.1969.

Pathology. — The mites live within the epidermis of the ear concha, causing hyperceratosis.

Deposition of types. — Holotype and allotype: Zoologisches Institut und Zoologisches Museum, Hamburg.

Paratypes ♀ and ♂: U.S. National Museum, Washington; British Museum (Natural History), London, coll.nr. 1971/158-9; Rijksmuseum van Natuurlijke Historie, Leiden, coll.nr. P 1213-4; Naturhistorisches Museum, Wien; Muséum National d'Histoire Naturelle, Paris, coll.nr. 11.I. 13-14; Acarology Laboratory, Columbus, Ohio; Field Museum of Natural History, Chicago; Institut de Médecine Tropicale Prince Léopold, Antwerpen; Department of Zoology, Catholic University, Nijmegen.

Psorergates baueri[1]) spec. nov.
(Figs. 14—19)

Female (holotype). — Shape and body build as in other species of the genus *Psorergates* from insectivora (Lukoschus 1968a, b). Length including gnathosoma 117 μ, average in 11 paratypes measured 114 μ (99—129), width 92 μ, average in the paratypes 91 μ (78—101).

Venter (Fig. 14). Cuticula soft. In the middle of the venter two setae of about 4 μ (4—6), and 6 μ (5—10) apart. Epimera II—IV and anterior part of epimera I lying beneath the body surface. Posterior part of epimera I bent outwards and circularly closed. Genital opening 10 μ (8—11) long, lying between two adanal lobes, each of which carries a pair of terminal setae of 54 μ (48—58).

Legs inserted ventro-laterally. Articulation between epimera and trochanters strongly chitinized. All trochanters with a strongly sclerotized spur that is pointing to the anterior part of the body, and a small spur directed towards the large femoral spur. Distally to the strong spur a trochanteral seta of 5 μ (5—8). Femora of all legs with a large ventral spur. Femora I—III with a pair of postero-lateral setae of 24 μ (20—27), of which the basal is always shorter than the apical. Femur IV with only one seta: 24 μ (20—27). Postero-lateral setae on genua I—III 1 μ, on genu IV 36 μ (33—45). Tibia with short antero-ventral spine (lacking on leg IV) and a longer dorso-medial seta. Tarsi with postero-dorsal (*dp*) seta of 16 μ (14—18), antero-dorsal (*da*) seta of 2—3 μ and a ventral spine. Postero-dorsal seta not present on leg IV. Two solenidia on the dorsal

[1]) The species is named in honour of Dr. K. Bauer, Naturhistorisches Museum, Wien (Austria).

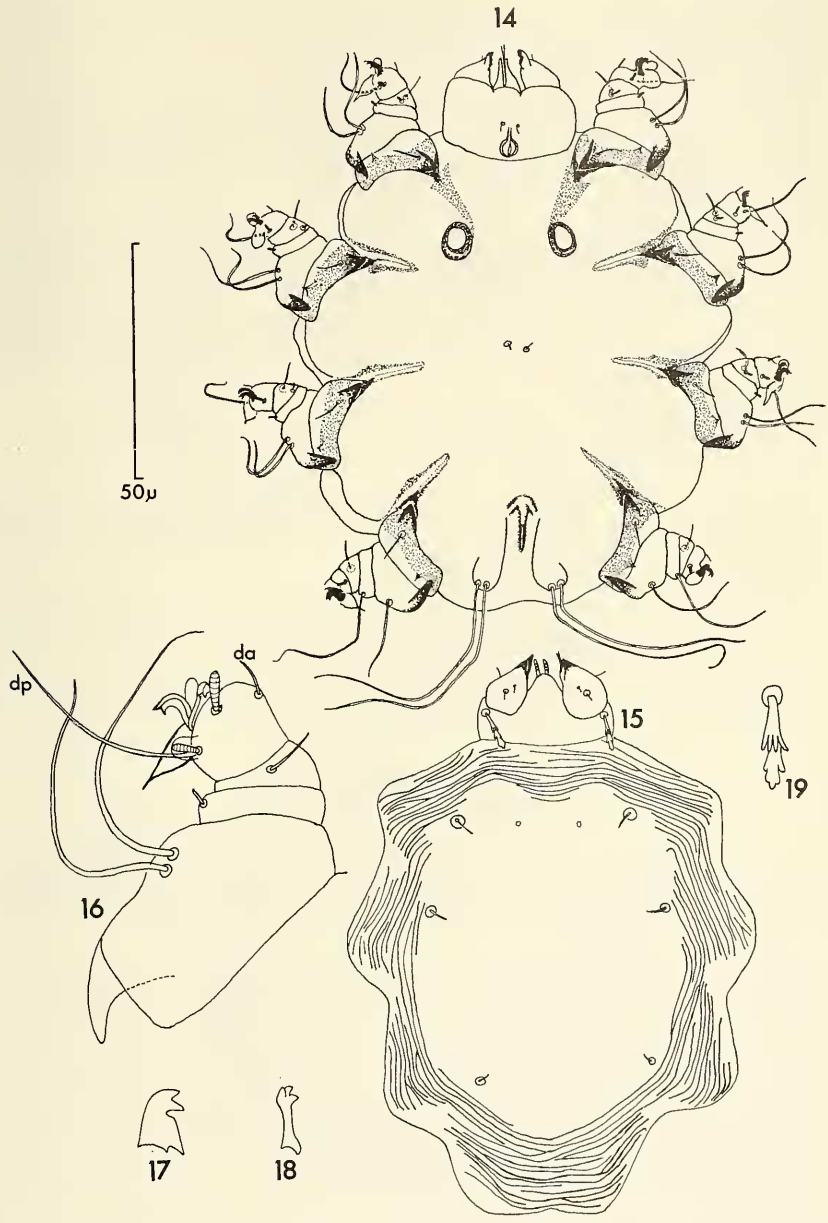

Fig. 14—19. *Psorergatus baueri* spec. nov., female. 14, holotype, venter; 15, holotype, dorsum; 16, leg I, femur-tarsus, dorsal; 17, chelicera in lateral view; 18, palpal claw in lateral view; 19, gnathosomal seta

side of tarsi I and II (Fig. 16), dorso-medial solenidion bulbous. antero-lateral within a duplication of the epidermis. Two two-pointed claws and a bi-lobed empodium inserted ventrally at the end of the tarsi.

Dorsum (Fig. 15). Dorsal shield well sclerotized and distinctly punctured. Soft parts of dorsum striated. Length of shield 77 μ, average in the paratypes 77 μ (67—81), width 58 μ, average in paratypes 62 μ (53—68). Three pairs of lateral setae, distinctly distant from the margin of the shield. Second pair 4 μ (3—5) long. Antero-medially of first pair of lateral setae a pair of minute setae present.

Gnathosoma and mouth parts like in other *Psorergates* species. Gnathosomal setae bilobed, 7 μ (5—8), short lobe with relatively deeply incised border (Fig. 19). Posterior dorsal seta on palpal tibia very short (2 μ). Further present on palpal tibia: a very small anterior seta, a lateral seta, and a spur on the dorsal end. Palpal tarsus with two claws (Fig. 18) and one spine. Chelicerae with stinging bristles and dorsally dentated digitus fixus (Fig. 17).

Male unknown.

Immature stages. — Egg: thin-shelled, 69 × 58 μ, 78 × 69 μ, 71 × 60 μ.

Larva: Like in other *Psorergates* species, 76 × 62 μ.

Protonymph: Not found.

Deutonymph: Like in other *Psorergates* species, 120 × 99 μ, without spurs on fused leg segments.

Type host. — *Neomys fodiens* (Pennant).

Type locality. — St. Michael, Salzburg, Austria, 9.VII.1967.

Pathology. — The mites were found between the tendons of the forelegs within the upper layers of the epidermis, causing hyperceratosis.

Deposition of types. — Holotype ♀ at Wien; paratypes at Leiden P 1218-9, Hamburg, Washington, Antwerpen, Nijmegen, London (1971/166), Paris (11 J 15).

Psorergates neerlandicus spec. nov.
(Figs. 20—25)

Female (holotype). — Shape and body build as in other *Psorergates* species from the *apodemi*-group (Lukoschus, Fain & Beaujean, 1967). Length, including gnathosoma, 132 μ, the same as in two paratypes, width behind second pair of legs 115 μ, like in paratypes.

Venter (Fig. 20). Venter with soft cuticula. In the middle two ventral setae of 7 μ long, 9 μ apart. Genital opening 10 μ long, lying beween trochanteral spurs IV, flanked by two adanal lobes, each of which carries a pair of terminal setae of about 79 μ long. Chitineous ducts from genital opening indistinct. Anus not present. Posterior part of epimera I half circular, bent outwards. This crescent-shaped part standing out from the venter. Anterior part of epimera slightly, articulation with trochanters strongly chitinized. Epimera II—IV shaped as an oblong obtuse-angled triangle beneath surface of venter. Inwards-pointing parts slightly, articulation with trochanters, strongly sclerotized.

Legs inserted ventro-laterally. Trochanters with strong, extending ventral spur, pointing to the anterior part of the body, and a seta (9 μ) distally of this spur. Basal part of trochanters strongly chitinized with a small spur towards the femoral spur. Femora of all legs with a pair of postero-lateral setae and a large ventral spur. Basal seta of pairs

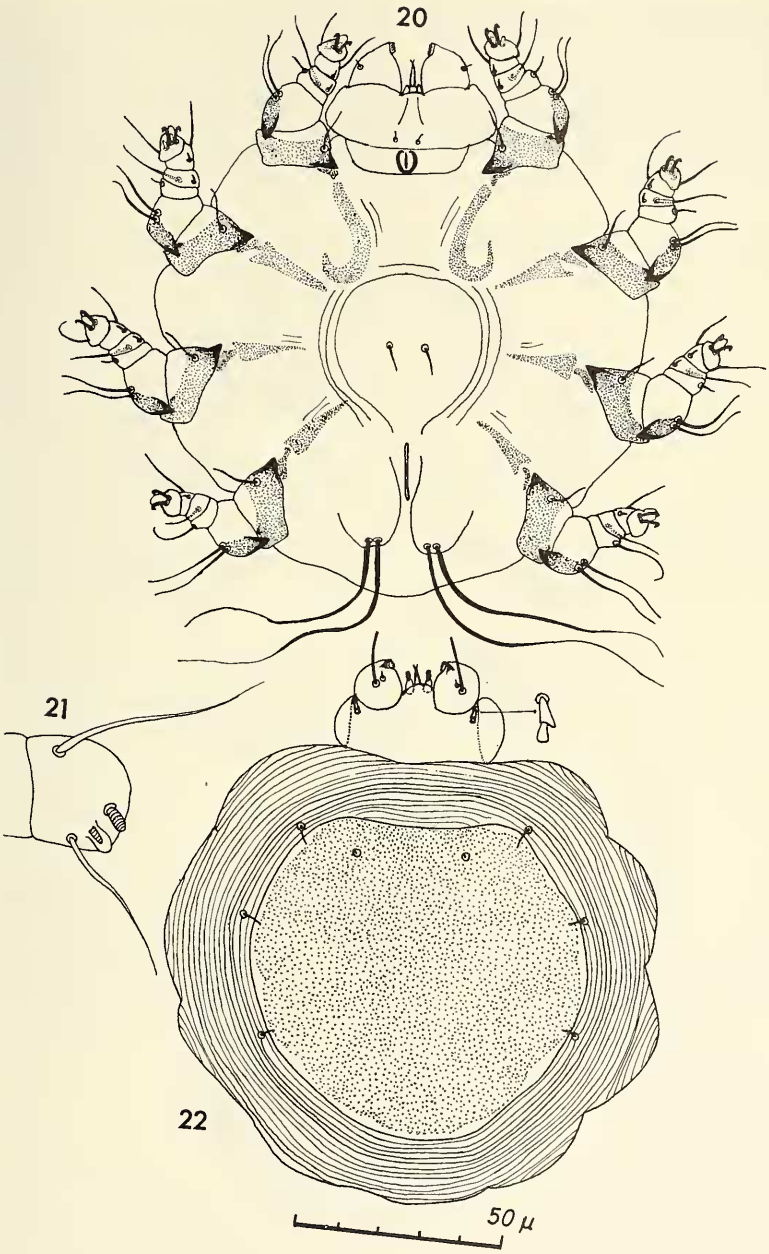

Fig. 20—22. *Psorergates neerlandicus* spec. nov. female. 20, holotype, venter; 21, leg I, tarsus, dorsal; 22, holotype, dorsum

always little shorter than apical. Apical setae 19 μ long on femora I—III, 24 μ on femur IV. A seta present upon a small sclerotized elevation on the genua, with the length of 16 μ on genu IV and of 5 μ on genua I—III. Short tibia with an antero-ventral spine (lacking on tibia IV) and a longer dorso-medial seta. Tarsi with antero-ventral spine, postero-dorsal seta and antero-dorsal seta of about the same length. Postero-dorsal setae not present on tarsus IV. Tarsi I and II with a big, club-shaped solenidion and a smaller solenidion within a duplication of the epidermis (Fig. 21).

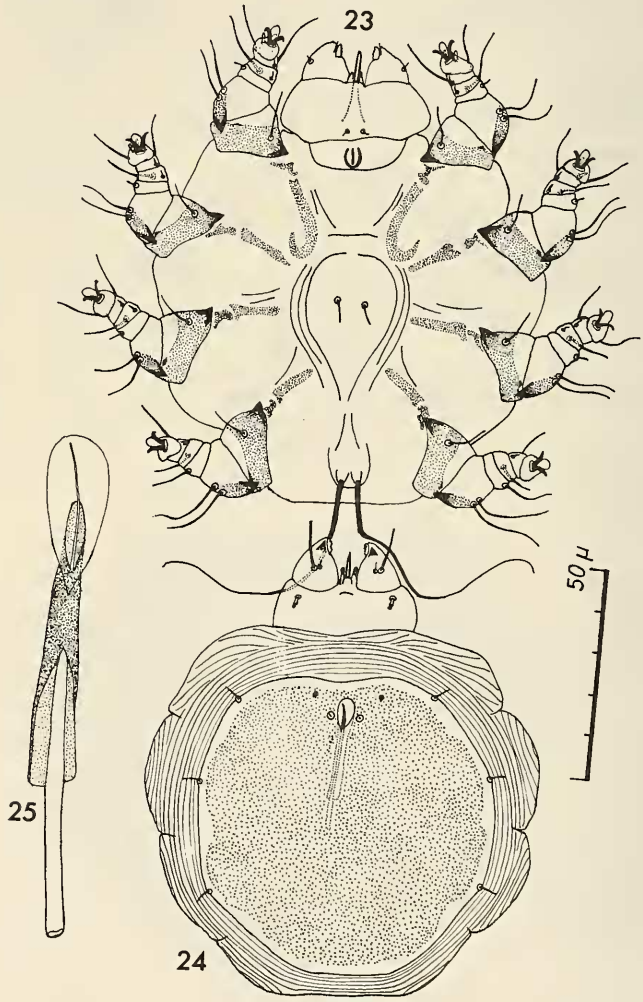

Fig. 23—25. *Psorergates neerlandicus* spec. nov. male. 23, allotype, venter; 24, allotype, dorsum; 25 penis, enlarged

Both strong single-pointed claws and bilobed empodium inserted ventrally at the end of the tarsus.

Dorsum (Fig. 22). Dorsal shield well sclerotized and punctured up to 2 μ from the shield border. Distinctly marked off from the softly chitinized, striated dorsal side. Length of shield 77 μ, width 77 μ. Three pairs of lateral setae of 5 μ, standing at the border of the shield. Median setae very small, nearly point-shaped, situated 8 μ from shield margin.

Gnathosoma and mouth parts like in other *Psorergates* species. Gnathosomal setae 4 μ long, two-segmented, with unindented border. Middle part of gnathosoma epistoma-like, covering mouth opening and posterior part of the chelicerae. Palpal tibia with two dorsal setae: posterior one 12 μ long and well-developed up to the end (seems to be broken), anterior seta very short (1 μ). On lateral side of the palp a soft seta. Dorsal end of palpal tibia with strongly chitinized spur. Palpal tarsus inserted ventro-medially. Chelicerae consisting of dentated digitus fixus with saw-function and stinging bristles.

Male (allotype). — Shape and body build like in other *Psorergates* species from *apodemi*-group. Length including gnathosoma 110 μ, average in 4 paratypes 109 μ (104—119), width 94 μ, average in the paratypes 94 μ (82—101).

Venter (Fig. 23). Terminal setae 62—67 μ long, standing on a small sclerotized median tubercle. Setae on ventral side barely shorter than in female: ventral setae 5—6 μ, distance between ventral setae 7—10 μ, trochanteral setae 7—9 μ, femoral setae I—III 16—20 μ, femoral setae IV 19—20 μ, genual setae I—III 2 μ and genual setae IV 12—14 μ.

Dorsum (Fig. 24). Similar to female, but antero-medially on dorsal shield an oval genital opening with two pairs of minute setae. Anterior pair of genital setae 18—19 μ apart, posterior pair 7 μ apart. Average length of shield 73 μ (70—78), width 70 μ (67—73). Lateral shield setae 4 μ long. Average length of penis 26 μ (24—30 μ), average length of penis envelope 22 μ (20—23) (Fig. 25). Penis envelope shortened on dorsal side.

Gnathosoma as in female. Posterior tibial setae of palp somewhat shorter: average 10 μ (8—11).

Type host. — *Microtus oeconomus* (Pallas).

Type locality. — Texel Island, the Netherlands, 26.IX.1968.

Pathology. — The mites were found within the epidermis on the venter of the abdomen, causing hyperceratosis and papillomitosis.

Deposition of types. — Holotype and allotype at Leiden P 1220-1. Paratypes: Antwerpen, Washington, Nijmegen.

Psorergates quercinus spec. nov.
(Figs. 26—33)

Female (holotype). — Shape and body build as in other species of the genus *Psorergates*. Length including gnathosoma 175 μ, averages in 10 paratypes measured 169 μ (157—179), width 125 μ, average in paratypes 143 μ (118—151).

Venter (Fig. 26). Cuticle soft. Ventral setae 11 μ long, 16 μ (14—18) apart. Anterior part of epimerae I and epimerae II—IV beneath body surface. Posterior part of epimerae I standing out from venter. Genital opening more chitinized than in other

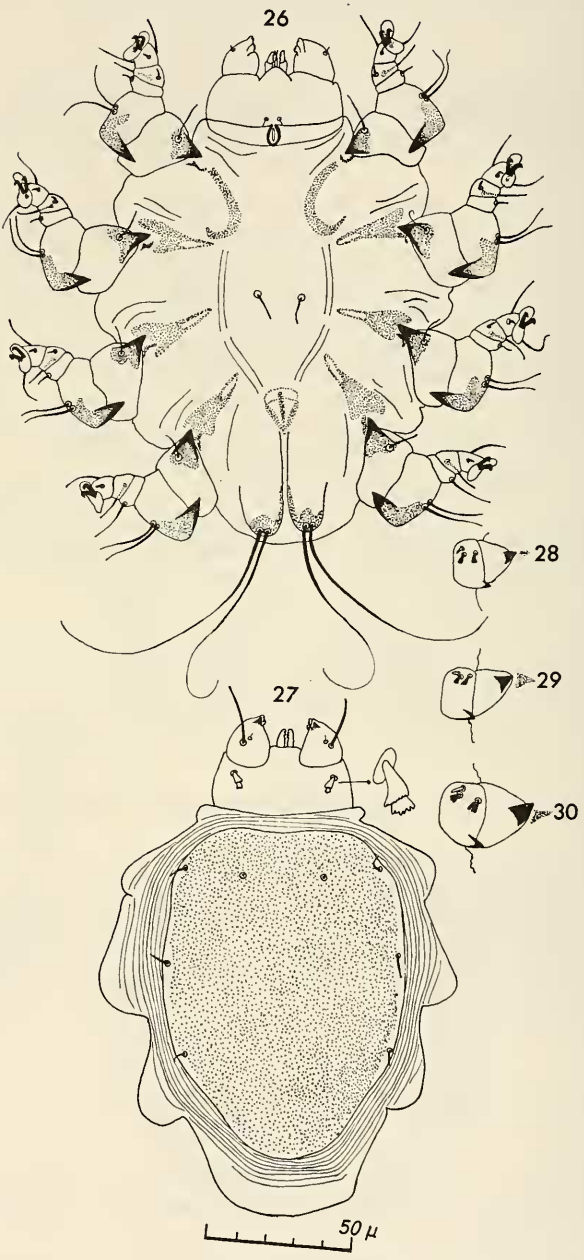

Fig. 26—30. *Psorergates quercinus* spec. nov. female. 26, holotype, venter; 27, holotype, dorsum; 28, larva, leg I, ventral; 29 protonymph, leg I, ventral; 30, deutonymph, leg I, ventral

species, 15 μ long, lying in front of two adanal lobes, each of which carries a pair of terminal setae of about 80 μ (72—84).

Legs inserted ventro-laterally. Trochanteral spurs peaked. Base of trochanters strongly chitinized. Trochanteral setae 12—16 μ. Femora with a large prominent spur and two setae. Apical one of these setae slightly longer than basal: 18—22 μ long on femur I—III, 22—24 μ on femur IV. Genua with a seta on a small elevation: 5 μ on genua I—III, 16—18 μ on genu IV. Tibiae with a thin antero-ventral spine (lacking on tibia IV) and a longer dorso-medial seta. Further present on tarsi an antero-ventral spine, a postero-dorsal seta (10 μ) and an antero-dorsal seta (11 μ). Postero-dorsal seta lacking on tarsus IV. Bilobed empodium and two single-pointed claws inserted ventrally at end of tarsus. Tarsi I and II with a big solenidion and a minute one within a duplication of the epidermis.

Dorsum (Fig. 27). Dorsal shield well sclerotized and distinctly punctured almost up to the margin. Anterior border slightly concave. Average length 112 μ (109—118), average width 85 μ (76—87). Shield setae standing on small unpunctured elevations, distinctly at some distance from shield border. Lateral setae 7—8 μ long. Minute median setae 16—18 μ from shield margin.

Gnathosoma and mouth parts as in other *Psorergates* species. Gnathosomal seta 5 μ long, at the end manifold incised. Palpal tibia dorsally with two setae of which the posterior one is 17—19 μ long and well-developed up to the end (seems to be broken). Anterior seta on palpal tibia very short; 2 μ. On lateral sides of the palpi a soft seta. Palpal tarsus inserted ventro-medially. Chelicerae with dentated digitus fixus and stinging bristles.

Male (allotype). — Shape and body build as in other *Psorergates* species. Length including gnathosoma 150 μ, average in 8 paratypes 142 μ (129—154), width 130 μ, in paratypes 123 μ (109—134).

Venter (Fig. 31), similar to female, but only two terminal setae (46—49 μ) on a long sclerotized median tubercle. Legs as in female, but all setae shorter; ventral setae 7 μ, distance between ventral setae 16—19 μ, trochanteral setae 6—9 μ, femoral setae I—III 12—14 μ, femoral setae IV 13—16 μ, genual setae I—III 2—4 μ and genual setae IV 8—13 μ.

Dorsum (Fig. 32). Dorsal shields well sclerotized and distinctly punctured. Behind the first pair of lateral setae shield bent inwards in a typical way, similar in all paratypes. Second lateral shield seta 5 μ long. Soft parts of dorsum striated. Two pairs of minute genital setae on small unpigmented tubercles, anterior genital setae 24—25 μ apart, posterior setae 19—20 μ apart. Length of single-pointed penis 46—52 μ, penis envelope 28—31 μ. Penis envelope deeply incised dorsally.

Gnathosoma as in female, palpal tibial setae (6—8 μ) and gnathosomal setae (4 μ) shorter.

Immature stages. — Egg. Almost globular, thin-shelled. Dimensions of 6 eggs measured: 91 × 85 μ, 94 × 85 μ, 91 × 85 μ, 85 × 79 μ 108 × 105 μ, 105 × 105 μ.

Larva. Disc-shaped with three pairs of two-segmented legs. Dimensions of three specimens measured: 96 × 77 μ, 91 × 88 μ, 116 × 99 μ. Cuticle soft with indistinct dorsal striation. Trochanters with well-developed spurs, small, indistinct epimera, segments femur to tarsus fused, forming a flattened unit with two three-pointed claws. On this unit further present: on leg I (Fig. 28) one solenidion and a small spur, on leg

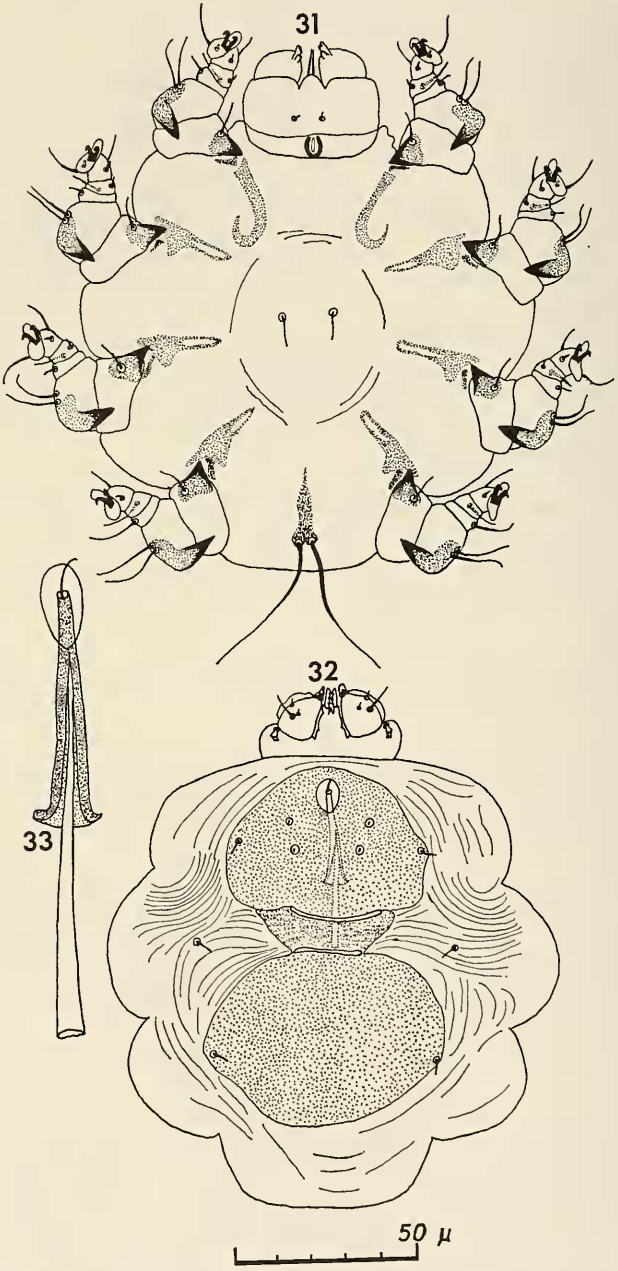

Fig. 31—33. *Psorergatus quercinus* spec. nov., male. 31, allotype, venter; 32, allotype, dorsum; 33, penis, enlarged

II one solenidion and an indistinct spur. Leg III without spur or solenidion. Gnathosoma almost as large as in adults, but setae on gnathosoma somewhat shorter.

Protonymph. Like larva, but four pairs of two-segmented legs. Spur on fused segment better developed and present on all legs. Solenidia present on leg I and II. Setae on gnathosoma longer than in larva, subgnathosomal setae somewhat shorter. Posterior palpal tibial setae 4 μ long. Average length in 4 specimens measured 131 μ (119—142), average width 117 μ (108—128).

Deutonymph. Like protonymph but larger. Spur on fused segment stronger than in protonymph. Posterior palpal tibial setae longer than in protonymph (6,5 μ). Average length in 5 specimens measured 173 μ (148—187), average width 148 μ (133—153).

Type host. — *Eliomys quercinus* (Linnaeus).

Type- locality. — Madrid, Spain, 16.VII.1967.

Pathology. — The mites live within the epidermis of the concha of the ears, causing hyperceratosis.

Deposition of types. — Holotype and allotype: Departamento de Zoologia del Suelo y Entomologia aplicada, Madrid. Paratypes: Hamburg, Washington, Leiden (P 1215-7), London (1971/156-7), Wien, Paris (11 J 11-12), Ohio, Chicago, Antwerpen, Nijmegen.

Comparison with related species

On account of their characteristics one cannot incorporate *Psorergates muscardinus* and *Psorergates quercinus* within the *apodemi-*, *muricola-* or *dissimilis*-group. They show closer relationship to *Psorergates eliomydis*. Comparison of these three species is only possible for females. *P. muscardinus* is distinct from *P. eliomydis* by its bigger size, shape of the genital opening and bilobed gnathosomal setae. The epimerae I are less bent and narrower at the anterior end in *P. muscardinus*. The postero-dorsal seta (*dp*) on the tarsi is only slightly longer than the antero-dorsal seta (*da*) in *P. eliomydis*, but more than twice as long in *P. muscardinus*. Further differences are to be found in the length of ventral setae, genual setae, lateral shield setae, posterior palpal tibial setae and gnathosomal setae.

P. quercinus differs mainly from *P. eliomydis* by its bigger size and bilobed gnathosomal setae. The anterior end of the epimera I is narrow and lying beneath the body surface, as contrasted with *P. eliomydis*. There also are differences in length of the ventral setae, femoral setae I—III and gnathosomal setae.

Females of *P. muscardinus* and *P. quercinus* have the same size, but differ in shape of the gnathosomal setae, genital opening and anterior part of the epimera I. The dorsal shield of *P. quercinus* is more oblong than in *P. muscardinus*. The median setae are farther removed from the shield margin in *P. quercinus* and further differences are present in the length of the femur setae I—III, posterior palpal tibial setae, and the distance between the ventral setae. The males are more different. The typical shape of the dorsal shield of *P. quercinus* males is an important distinctive character. Also remarkable is the difference in length of penis and penis envelope. The genital setae are much wider apart in *P. quercinus* than in *P. muscardinus*. Further differences are present in the length of the terminal setae, setae of genu IV, shield setae and posterior palpal tibial setae.

Psorergates neerlandicus shows the diagnostic characters of the *apodemi*-group; the

palpal tibial setae are thick (and seem to be broken at the end). In the males the anterior genital setae are more than twice as far apart as the posterior ones. There are very few differences between this species and *P. microti*. Females only differ slightly in size and length of some setae. *P. neerlandicus* females have longer terminal, ventral, femoral and gnathosomal setae. Males of *P. neerlandicus* have obviously longer terminal and shorter genual setae I—III than males of *P. microti*. Further there are minor differences present in the lengths of femoral setae I—III and penis envelope.

P. baueri from the host *Neomys fodiens*, belongs to the "insectivora"-group, because the dorso-anterior setae of the tarsi are short, the lateral shield setae are distinctly remote from the shield margin and the ends of the gnathosomal setae are incised several times. The relationship to *P. sorici* and *P. cinereus* appears from the bi-pointed claws and the presence of only one seta on femur IV.

P. cinereus is much bigger than *P. baueri* and there are obvious differences in the times. The relationship to *P. sorici* and *P. cinereus* appears from the bi-pointed claws and gnathosomal setae. There is less difference between *P. sorici* and *P. baueri*: *P. baueri* has shorter femoral setae IV, trochanteral setae and gnathosomal setae, but the ventral setae are slightly longer.

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